

*The article below first appeared in the May 1989 issue of "Ordnance" and was subsequently published in the summer 1991 issue of the "Army Trainer." Although some of the information provided such as "Currently Available" and "Under Development" technical manuals as well as the availability of TV tapes and lesson materials is somewhat outdated, the concepts presented are still very valid. While the misconceptions cited in the original article continue, our recommendations for what training programs within the units should contain are still applicable and should be followed. The U.S. Army Training and Doctrine Command's Executive Agency for BDAR, located at the U.S. Army Ordnance Mechanical Maintenance School at Aberdeen Proving Ground, Md., is currently preparing an updated article for posting to this web site. -- Roger*

## **Battlefield damage assessment and repair in units**

*Quick fixes in the heat of battle can keep vehicles and equipment mission ready. With battlefield damage assessment and repair (BDAR) training, soldiers can do what it takes to keep fighting -- and win. Find out how to "think BDAR" in your unit.*

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Battlefield damage assessment and repair (BDAR): Use of simple, quick fixes performed in the field by crew and mechanics with minimum tools and materials.

Purpose of these quick fixes: Restore weapon systems, vehicles and other equipment to full or partial mission capability. Or, they could allow weapon systems and vehicles to self-recover and continue to fight.

### **BDAR is not new**

Another name for BDAR is "field expedient repair." This concept played a significant role on battlefields of World War II, Korea and Vietnam. When necessary, crew and mechanics have used extraordinary

means to save equipment or to keep it in the fight.

In past conflicts, field expedient repairs were passed by word of mouth or reinvented many times over as the need arose. That has now changed. The Army has collected, validated and published in special technical manuals (TM) a comprehensive description of field expedient repairs applicable to weapon systems, wheeled vehicles and other materiel.

Other TMs under development include those for petroleum, oils and lubricants, air conditioners and generators. These special TMs are the heart of the Army's BDAR program and are easily recognizable by the BD designation as the two characters of the TM number.

The concept of BDAR is not new. However, recognition of BDAR as vital and publication of BDAR manuals are. They contribute to improved field expedient repair on the battlefield.

### **Training makes the difference**

Our capability to improve field expedient repair over what existed during previous conflicts depends on the training that crews and mechanics receive in their units. If we expect to profit from BDAR during wartime, we must practice it in peacetime. Most commanders realize this. But, two misconceptions hamper execution.

### **Misconception #1: Soldiers need extensive BDAR training**

Our experience from joint live-fire exercises in Germany and local survivability tests on the M1 and M2/3 indicate that crew members and mechanics learn BDAR quickly. Reason: They develop no new competencies.

Instead, they use existing knowledge and skills in different ways. For example, if an individual can replace a fuel filter, he has all the knowledge and skills necessary to bypass a fuel filter for BDAR purposes.

Our first experience with training soldiers to accomplish BDAR came during a 1986 live-fire exercise. Mechanics from two armor divisions

participated in the damage assessment and repair activities. One division had received BDAR training as part of its unit training program.

These soldiers hit the ground running. They applied their knowledge and skills about systems and components to quickly assess problems and fix them. Those damages repairable by conventional methods in a short period were done that way. Other damages were repaired with BDAR fixes where possible.

The other division had not received any BDAR training before arrival at the live-fire site. These soldiers attended a two-hour BDAR training session. The session consisted of an orientation to BDAR and familiarization with available BDAR manuals and assessment procedures. They were not taught any new skills.

During the assessment and repair activities following each firing, these soldiers performed equally as well as those from the division that had BDAR unit training. We could not have asked for better control and experimental group comparison for validating effectiveness of this rapid training approach.

The BDAR rapid train-up finding from 1986 was replicated during 1987. None of the mechanics had received BDAR training as part of their unit training program. After attending the two-hour BDAR training session, they performed as well as the 1986 participants. The same pattern occurred again in 1988.

We included crew members in addition to mechanics in the 1988 BDAR activities and during an Abrams live-fire exercise. We used the same training approach, and the results were the same: Crew members can perform BDAR with little formal training.

The reason for this is easily understood by examining the BDAR TMS. First of all, BDAR repairs are, for the most part, limited to relatively simple tasks that can be performed quickly with readily available tools and materials. In addition, the TMs are easy to understand and contain useful illustrations.

Crews and mechanics have the necessary knowledge and skills to perform BDAR once they are released from the edict, "Do it by the book." In recent years we have stressed that all repairs should be done according to TM procedures. We've done a great job of instilling that mind set. As a result, soldiers are afraid to deviate from the TM.

The first objective of our BDAR training sessions is to break that mind set. We convince soldiers that there will be instances on the battlefield when deviating from the TM is permissible -- and necessary.

### **Misconception #2: Practicing BDAR Requires Battlefield-Damaged Equipment**

Battlefield damaged equipment is not required for BDAR training. The important thing is that soldiers have the opportunity to think BDAR routinely and practice BDAR fixes.

Thinking BDAR is a critical element a unit can easily build into its normal routine. For any breakdown, the first step could be identifying a BDAR fix, from the manual, to use if normal support is not available. This doesn't require a lot of time; it ensures soldiers are knowledgeable of the BDAR fixes in the manuals.

Thinking BDAR accomplishes a lot, but it's not the total answer. Soldiers need to see it in action and be part of that action. There must be training exercises in which soldiers can apply a BDAR fix and see the results. Units can accomplish this with either inoperative or fully mission-capable equipment.

For example, soldiers do not need damaged or inoperative equipment to practice short tracking or bypassing a filter or other component. Trainers should provide time to practice these things if they expect soldiers to maximize potential of BDAR on the battlefield.

### **Risk Factor**

We categorize BDAR fixes as low, medium or high risk:

- \* Low risk -- little to no likelihood of safety hazard or damage to equipment associated with this repair.

- \* Medium risk -- some risk of equipment damage associated with this repair. Should only be performed under close supervision. Example: replacing radio antenna with telephone cable.

- \* High risk -- operating equipment

after this repair can cause damage to the equipment or become a serious safety hazard. Use of these tasks for training should be approved by the commander and closely supervised. Example: bypassing a fuel filter.

Low risk BDAR fixes are prime candidates for training. Fortunately, a majority of the BDAR fixes for the M1 and M2/3 fall into this category. Our data indicate a similar system for other equipment items.

Classifying tasks is a relatively easy exercises. Possible equipment damage and safety hazards are listed in the BDAR TM under "Limitations" and "Cautions."

Equipment in the shop for repair or awaiting parts provides excellent opportunities to practice BDAR, especially for mechanics. Broken or bent parts, damaged cables, broken belts and similar problems are prime candidates. However, mechanics must have the time for this; trainers must locate targets of opportunity.

Retained non-recoverable items can be used as training aids and provide BDAR practice opportunities. Non-standard or commonly available items can be used. For example, try substituting regular water hose for radiator hose for practicing patching techniques.

Use metal containers to practice patches applicable to radiators, reservoirs and oil pans. Any type of wire can be bundled together to practice wiring harness repair. Training opportunities are limited only by the imagination of the maintenance NCOs and warrant officers.

## **Unit BDAR Training Program**

Based on experience to date, we recommend that a unit BDAR program contain the following:

- \* An orientation for crew/operators and mechanics to ensure they understand the role that BDAR will play during future conflicts and to familiarize them with the BDAR TM they will use.

- \* Provisions for breaking the mind set against performing unconventional repairs. These should include:

- Requiring crew/operators and mechanics to identify, for each breakdown, any BDAR repairs that could be used to restore full or partial operational capability.

- Providing time for crew/operators and mechanics to practice performing BDAR fixes on fully mission-capable equipment or equipment awaiting repair. Where practical, soldiers should be able to see equipment operate with the BDAR fix incorporated.

- Using various locally available materials and parts that are not salvageable as training aids to perform repairs and patches.

- Playing BDAR "what if" games when other resources are not available.

- \* Incorporate BDAR thinking as a first step in any repair action so that it becomes part of the normal routine.

Commanders currently have the

necessary expertise in their units to accomplish a successful BDAR unit training program. They have the equipment, the BDAR TMS and the know-how.

Since 1986, graduates of Ordnance NCO and warrant officer courses have received instruction on BDAR assessment, repair and management and development of a BDAR training program. These graduates with a BDAR background are available throughout the Army. Commanders should use them to develop and implement their unit's BDAR training program.

## **Final Notes**

A peacetime benefit from BDAR training and experience: Soldiers are able to identify additional BDAR fixes not included in the TMs. For example, recently one of our NCOs found that a seat belt anchor is a perfect replacement for the steering linkage on the M2/3.

Any soldier who identifies a new fix should submit it to TAACOM, using DA Form 2028-2.

Think and practice BDAR during peacetime so it will happen during wartime.